Syslog and Log Rotate

Reference: NYCU CSCC SA Course

國立成功大學資訊工程系
Department of Computer Science and Information Engineering, NCKU

Log files

- Execution information of each services
  - sshd log files
  - httpd log files
  - ftpd log files
- Purpose
  - For post-incident tracking
  - Like insurance

```
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96553119
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96553119
ad3: FAILURE - READ_DMA status=51<READY,DSC,ERROR> error=84<ICRC,ABORTED>
LBA=96553119
g_vfs_done():ad3s1a[READ(offset=49435164672, length=36864)]error = 5
vnode_pager_getpages: I/O read error
vm_fault: pager read error, pid 850 (cp)
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96556319
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96556319
ad3: FAILURE - READ_DMA status=51<READY,DSC,ERROR> error=84<ICRC,ABORTED>
LBA=96556319
g_vfs_done():ad3s1a[READ(offset=49436803072, length=36864)]error = 5
vnode_pager_getpages: I/O read error
vm_fault: pager read error, pid 850 (cp)
```

Logging Policies

- Common schemes
  - Throw away all log files
  - Rotate log files at periodic intervals

```
#!/bin/sh
/usr/bin/cd /var/log
/bin/mv logfile.2.gz logfile.3.gz
/bin/mv logfile.1.gz logfile.2.gz
/bin/mv logfile logfile.1
/usr/bin/touch logfile
/bin/kill -signal pid
/usr/bin/gzip logfile.1
```

  - Archiving log files

```
0  3  *  *  *   /usr/bin/tar czvf  /backup/logfile.`/bin/date +\%Y\%m\%d`.tar.gz  /var/log
```

Finding Log Files

- Ways and locations
  - Common directory
    - /var/log
  - Read software configuration files
    - Ex: /usr/local/etc/apache22/httpd.conf

```
TransferLog /home/www/logs/access.log
```

    - Ex: /usr/local/etc/smb.conf

```
log file = /var/log/samba/%m.log
```

  - See /etc/syslog.conf

Under /var/log in FreeBSD (1/2)

- You can see that under /var/log …

Lots of logs

```
[/var/log]  ls
./                lastlog          maillog.7.bz2    sendmail.st
../               lpd-errs         messages         sendmail.st.0
auth.log          maillog          messages.0.bz2   sendmail.st.1
cron              maillog.0.bz2    messages.1.bz2   sendmail.st.2
cron.0.bz2        maillog.1.bz2    messages.2.bz2   sendmail.st.3
cron.1.bz2        maillog.2.bz2    mount.today      setuid.today
cron.2.bz2        maillog.3.bz2    mount.yesterday  wtmp
debug.log         maillog.4.bz2    pf.today         xferlog
dmesg.today       maillog.5.bz2    ppp.log
dmesg.yesterday   maillog.6.bz2    security
```

- Applications

Under /var/log in FreeBSD (2/2)

- Logs – because of syslogd

```
$ cat /etc/syslog.conf | grep -v ^#
*.*                                                     /var/log/all.log
*.*                                                     @loghost
*.err;kern.warning;auth.notice;mail.crit                        /dev/console
*.notice;authpriv.none;kern.debug;lpr.info;mail.crit;news.err   /var/log/messages
security.*                                              /var/log/security
auth.info;authpriv.info                                 /var/log/auth.log
mail.info                                               /var/log/maillog
lpr.info                                                /var/log/lpd-errs
ftp.info                                                /var/log/xferlog
cron.*                                                  /var/log/cron
*.=debug                                                /var/log/debug.log
*.emerg                                                 *
console.info                                            /var/log/console.log
!sudo
*.*                                                     /var/log/sudo.log
```

Syslogd

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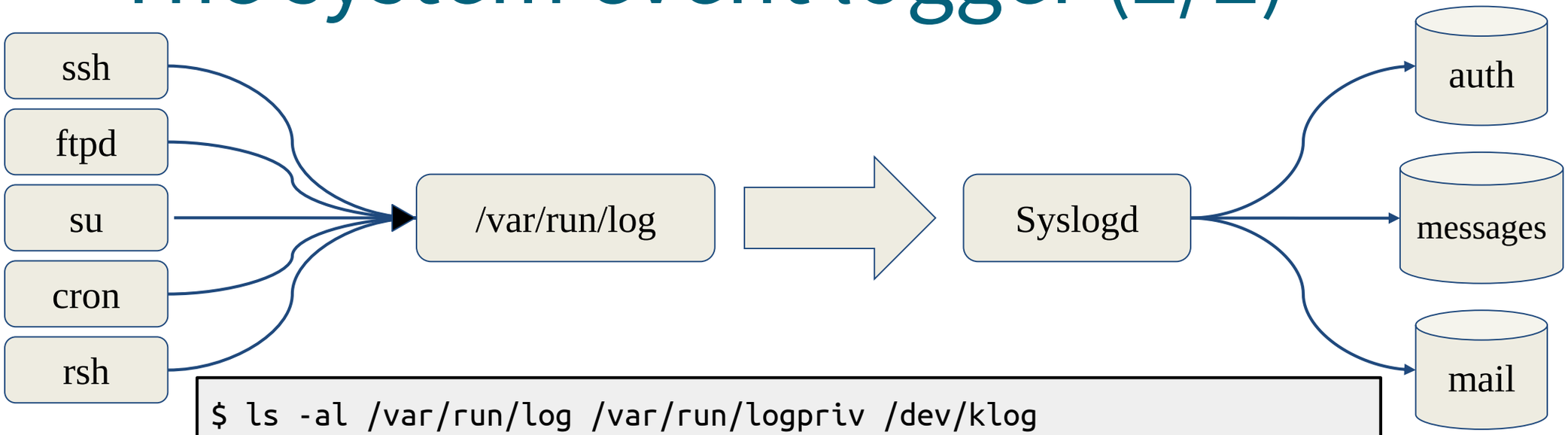
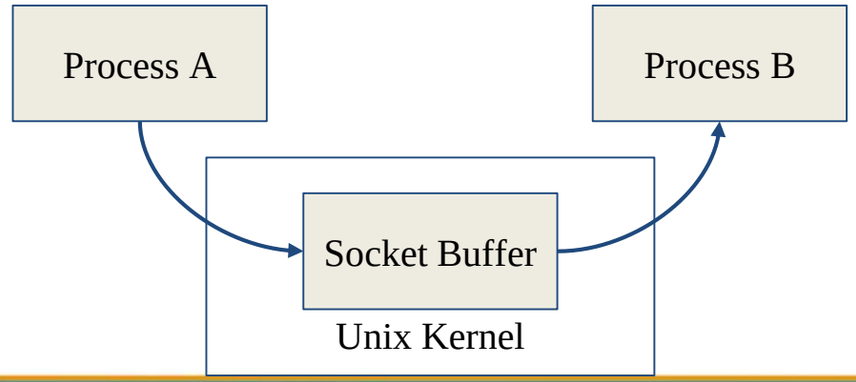
Syslog – The system event logger (1/2)

- Two main functions
  - To release programmers from the tedious of writing log files
  - To put administrators in control of logging
- Three parts:
  - syslogd, /etc/syslog.conf
    - The logging daemon and configure file
  - openlog(), syslog(), closelog()
    - Library routines to use syslogd
  - logger
    - A user command that use syslogd from shell

Syslog – The system event logger (2/2)




```
$ ls -al /var/run/log /var/run/logpriv /dev/klog
crw-------  1 root  wheel  0x17 Sep  9 18:19 /dev/klog
srw-rw-rw-  1 root  wheel     0 Sep  9 18:20 /var/run/log
srw-------  1 root  wheel     0 Sep  9 18:20 /var/run/logpriv
```



Configuring syslogd (1/6)

- Basic format
  - The configuration file /etc/syslog.conf controls syslogd's behavior
  - selector <Tab> action
    - **Selector: program.level**
      - **Program: the program that sends the log message**
      - **Level: the message severity level**
    - **Action: tells what to do with the message**
  - Ex.
    - mail.info /var/log/maillog

Configuring syslogd (2/6)

- selector
  - Syntax: facility.level
    - Facility and level are predefined
      (see next page)
  - Combined selector
    - facility.level
    - facility1,facility2.level
    - facility1.level;facility2.level
    - *.level
  - Level indicate the minimum importance that a message must be logged
  - A message matching any selector will be subject to the line's action

Configuring syslogd (3/6)

Facility	Programs that use it
`kern`	The kernel
`user`	User processes (the default if not specified)
`mail`	**sendmail** and other mail-related software
`daemon`	System daemons
`auth`	Security and authorization-related commands
`lpr`	The BSD line printer spooling system
`news`	The Usenet news system
`uucp`	Reserved for UUCP, which doesn't use it
`cron`	The **cron** daemon
`mark`	Timestamps generated at regular intervals
`local0-7`	Eight flavors of local message
`syslog`	**syslogd** internal messages
`authpriv`	Private authorization messages (should all be private, really)
`ftp`	The FTP daemon, **ftpd**
`*`	All facilities except "mark"

Level	Approximate meaning
`emerg`	Panic situations
`alert`	Urgent situations
`crit`	Critical conditions
`err`	Other error conditions
`warning`	Warning messages
`notice`	Things that might merit investigation
`info`	Informational messages
`debug`	For debugging only

facility: auth, authpriv, console, cron, daemon, ftp, kern, lpr, mail, mark, news, ntp, security, syslog, user, uucp, and local0 through local7

Configuring syslogd (4/6)

- Action
  - filename
    - Write the message to a local file
  - @hostname
    - Forward the message to the syslogd on hostname
  - @ipaddress
    - Forwards the message to the host at that IP address
  - user1, user2
    - Write the message to the user's screen if they are logged in
  - *
    - Write the message to all user logged in

Configuring syslogd (5/6)

- Ex.

```
*.emerg                                          /dev/console
*.err;kern,mark.debug;auth.notice;user.none      /var/log/console.log
*.info;kern,user,mark,auth.none                  @loghost
*.alert;kern.crit;local0,local1,local2.info      root
```

```
lpr.err ➔/var/log/console.log
          @loghost
```

Level	Approximate meaning
emerg	Panic situations
alert	Urgent situations
crit	Critical conditions
err	Other error conditions
warning	Warning messages
notice	Things that might merit investigation
info	Informational messages
debug	For debugging only

Configuring syslogd (6/6)

- Output of syslogd

```
Aug 28 20:00:00 chbsd newsyslog[37324]: logfile turned over due to size>100K
Aug 28 20:01:45 chbsd sshd[37338]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:01:47 chbsd sshd[37338]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:07:15 chbsd sshd[37376]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:07:17 chbsd sshd[37376]: error: PAM: authentication error for root from 204.16.125.3
Aug 30 09:47:49 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/home/chwong ; USER=root ; COMMAND=
Aug 30 22:02:02 chbsd kernel: arp: 140.113.215.86 moved from 00:d0:b7:b2:5d:89 to 00:04:e2:10:
Aug 30 22:05:13 chbsd kernel: arp: 140.113.215.86 moved from 00:04:e2:10:11:9c to 00:d0:b7:b2:
Sep  1 14:50:11 chbsd kernel: arplookup 0.0.0.0 failed: host is not on local network
Sep  3 13:16:29 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/b
Sep  3 13:18:40 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 13:25:06 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 13:27:09 chbsd kernel: arp: 140.113.215.86 moved from 00:d0:b7:b2:5d:89 to 00:04:e2:10:
Sep  3 13:27:14 chbsd kernel: arp: 140.113.215.86 moved from 00:04:e2:10:11:9c to 00:d0:b7:b2:
Sep  3 15:27:05 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 15:27:10 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 15:27:25 chbsd sudo:   chwong : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
```

Software that use syslog (1/2)

Program	Facility	Levels	Description
amd	daemon	err-info	NFS automounter
date	auth	notice	Sets the time and date
ftpd	daemon	err-debug	FTP daemon
gated	daemon	alert-info	Routing daemon
halt/reboot	auth	crit	Shutdown programs
inted	daemon	err, warning	Internet super-daemon
login/rlogind	auth	crit-info	Login programs
lpd	lpr	err-info	BSD line printer daemon
named	daemon	err-info	Name server (DNS)
nnrpd	news	crit-notice	INN news readers
ntpd	daemon, user	crit-info	Network time daemon
passwd	auth	err	Password-setting program
popper	local0	notice, debug	Mac/PC mail system
sendmail	mail	alert-debug	Mail transport system
su	suth	crit, notice	Switches UIDs
sudo	local2	alert, notice	Limited **su** program
syslogd	syslog, mark	err-info	Internal errors, timestamps
tcpd	local7	err-debug	TCP wrapper for **inetd**
cron	cron, daemon	info	System task-scheduling damemon
vmunix	kern	varies	The kernel

FreeBSD Enhancement (1/2)

- Facility name
  - FreeBSD allows you to select messages based on the name of the program

```
!sudo
*.*    /var/log/sudo.log
```

- Severity level

Selector	Meaning
`mail.info`	Selects mail-related messages of info priority and higher
`mail.>=info`	Same meaning as mail.info
`mail.=info`	Selects only messages at info priority
`mail.<=info`	Selects messages at info priority and below
`mail.<info`	Selects all priorities lower than info
`mail.>info`	Selects all priorities lower than info

FreeBSD Enhancement (2/2)

- Restriction log messages from remote hosts
  - syslogd -a *.csie.nctu.edu.tw -a 140.113.209.0/24
  - Use -ss option to prevent syslogd from opening its network port
  - rc.conf

```
syslogd_enable="YES"
syslogd_flags="-a 140.113.209.0/24:* -a 140.113.17.0/24:*"
```

Debugging syslog

- logger
  - It is useful for submitting log from shell
- For example
  - Add the following line into /etc/syslog.conf

```
local5.warning      /tmp/evi.log
```

  - Use logger to verify
    - logger(1)

```
# logger -p local5.warning "test message"
# cat /tmp/evi.log
Nov 22 22:22:50 zfs chiahung: test message
```

    - The default priority is user.info
    - logger -h host

Using syslog in programs

```
#include <syslog.h>

int main() {
    openlog("mydaemon", LOG_PID, LOG_DAEMON);
    syslog(LOG_NOTICE, "test message");
    closelog();
    return 0;
}
```

```
$ tail -1 /var/log/messages
Nov 22 22:40:28 zfs mydaemon[4676]: test message
```

Log rotate

- Logs are rotated – because newsyslog facility
  - In crontab

```
$ grep newsyslog /etc/crontab
0       *       *       *       *       root    newsyslog
```

  - newsyslog.conf (newsyslog.conf(5), newsyslog(8))
    - ISO 8601 restricted time format: [[[[[cc]yy]mm]dd][T[hh[mm[ss]]]]]
    - Day, week, and month time format: [Dhh], [Ww[Dhh]], and [Mdd[Dhh]]

```
$ cat /etc/newsyslog.conf
# logfilename          [owner:group]  mode count size when  flags
[/pid_file] [sig_num]
/var/log/all.log                      600  7     *    @T00  J
/var/log/amd.log                      644  7     100  *     J
/var/log/auth.log                     600  7     100  *     JC
/var/log/console.log                  600  5     100  *     J
/var/log/cron                         600  3     100  *     JC
/var/log/daily.log                    640  7     *    @T00  JN
/var/log/debug.log                    600  7     100  *     JC
/var/log/maillog                      640  7     *    @T00  JC
/var/log/messages                     644  5     100  *     JC
/var/log/monthly.log                  640  12    *    $M1D0 JN
/var/log/security                     600  10    100  *     JC
/var/log/sendmail.st                  640  10    *    168   B
```

@19990122T000000 # 1999/1/22 00:00:00
@0122T00

$D23 # every day at 23:00, i.e., @T23
$W0D23 # every Sunday at 23:00
$W5D16 # every Friday at 16:00
$M1D0 # 1st day of each month at 00:00
i.e., @01T00
$M5D6 # 5th day of each month at 06:00
i.e., @05T06

J: compress using bzip2
C: create if not exist
N: no process should be signaled
B: Binary

Vendor Specifics

- FreeBSD
  - newsyslog utility
    - /etc/newsyslog.conf
  - /usr/ports/sysutils/logrotate
- Red Hat
  - logrotate utility
  - /etc/logrotate.conf, /etc/logrotate.d directory

```
$ cat mail
/var/log/mail/maillog /var/log/mail/mail.info  /var/log/mail.warn
/var/log/mail.err {
missingok
monthly
size=100M
rotate 4
create 0640 root security
nocompress
}
```